

WHAT IS CLAIMED IS:

1. A sheet sucking/feeding device which sucks an uppermost sheet among a plurality of stacked sheets, and separates the uppermost sheet from a sheet therebeneath and feeds the uppermost sheet out, said device comprising:

a plurality of suction cups provided at predetermined intervals along a transverse direction of the sheet, and sucking the sheet; and

a suction cup operation device which can displace at least one suction cup among the plurality of suction cups over a predetermined stroke in a suction cup axial direction independently of others of the suction cups, and which, at a point in time when the sheet is sucked by the plurality of suction cups and raised up by a predetermined amount, displaces the at least one suction cup so as to cause the sucked sheet to curve wavily along the transverse direction.

2. The sheet sucking/feeding device of claim 1, wherein the suction cup operation device comprises actuators connected independently to the respective suction cups, and when the sheet is sucked and raised up by the predetermined amount, the suction cup operation device displaces the suction cups by simultaneously driving at least every other one of the actuators.

3. The sheet sucking/feeding device of claim 2, wherein at least every other one of the actuators are a group of actuators, and a plurality of groups of actuators are set overall, and the respective groups of actuators are driven alternately.

4. The sheet sucking/feeding device of claim 1, wherein the suction cup operation device comprises a cam mechanism having cams which engage independently with the respective suction cups, and when the sheet is sucked and raised up by the predetermined amount, the suction cup operation device displaces the suction cups by simultaneously making at least every other one of the cams of the cam mechanism engage.

5. The sheet sucking/feeding device of claim 4, wherein at least every other one of the cams are a group of cams, and a plurality of groups of cams are set overall, and the respective groups of cams are driven alternately.

6. The sheet sucking/feeding device of claim 1, wherein the suction cups include highly-rigid suction cups at which a rigidity of a skirt portion is greater than a rigidity of a skirt portion of other suction cups,

the suction cup operation device comprises a pressure reducer reducing a suction negative pressure of at least the highly-rigid suction cups among the suction cups, and

when the sheet is sucked and raised up by the predetermined amount, the suction cup operation device deforms the skirt portions of the highly-rigid suction cups by reducing the suction negative pressure of the highly-rigid suction cups by the pressure reducer.

7. The sheet sucking/feeding device of claim 1, wherein the suction cups include highly-rigid suction cups at which a rigidity of a skirt portion is greater than a rigidity of a skirt portion of other suction cups,

the suction cup operation device comprises a pressure reducer reducing a suction negative pressure of the respective suction cups, and

when the sheet is sucked and raised up by the predetermined amount, the suction cup operation device deforms the skirt portions of the respective suction cups by simultaneously reducing the suction negative pressure of the respective suction cups by the pressure reducer.

8. The sheet sucking/feeding device of claim 1, wherein skirt portions of the respective suction cups have a same rigidity,

the suction cup operation device includes a pressure reducer individually reducing suction negative pressures of the respective suction cups, and

when the sheet is sucked and raised up by the predetermined

amount, the suction cup operation device reduces the suction negative pressure of at least one suction cup among the respective suction cups by the pressure reducer so as to deform the skirt portion of said at least one suction cup.

9. The sheet sucking/feeding device of claim 2, wherein the actuators are structured to include solenoids.

10. The sheet sucking/feeding device of claim 9, wherein the actuators are respectively connected to shafts of the suction cups via lift-up levers, and can raise up the suction cups.

11. The sheet sucking/feeding device of claim 10, wherein springs for ensuring a buffer stroke are wound on the shafts of the suction cups.

12. The sheet sucking/feeding device of claim 10, wherein the actuators and the lift-up levers are disposed, together with the suction cups, at a single base plate provided along the transverse direction of the sheets, so as to form a unit.

13. The sheet sucking/feeding device of claim 10, wherein the suction cup operation device having the actuators and the lift-up levers is provided separately from the suction cups.

14. A method of sucking and feeding a sheet which sucks an uppermost sheet among a plurality of stacked sheets, and separates the uppermost sheet from a sheet therebeneath and feeds the uppermost sheet out, said method comprising:

sucking the sheet along a transverse direction of the sheet;  
and

after sucking the sheet, raising the sheet up by a predetermined amount, and causing the sheet to curve wavily along the transverse direction.

15. The method of claim 14, wherein the sucking the sheet includes sucking the sheet by a plurality of suction cups provided along the transverse direction of the sheet.

16. The method of claim 15, wherein the raising the sheet up includes stroke-displacing at least one of the suction cups independently of others of the suction cups, in an axial direction of the suction cups.

17. The method of claim 15, wherein the causing the sheet to curve includes causing at least every other cam mechanism among cam mechanisms corresponding to the respective suction cups, to engage with a corresponding suction cup and displace the corresponding suction cup.

18. The method of claim 15, wherein causing the sheet to curve includes partially deforming at least one suction cup by reducing a suction pressure of the at least one suction cup.

19. The method of claim 15, wherein the causing the sheet to curve includes repeatedly reducing pressure of the suction cups.

20. The method of claim 15, wherein causing the sheet to curve includes reducing pressure in accordance with a combination of the suction cups and highly-rigid suction cups.